

## Case Report

# Left paraduodenal hernia: Case report and literature review

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### Abstract

Paraduodenal hernia (PDH) is the most common form of congenital internal hernia and constitutes a protrusion of bowel into the retroperitoneal space through peritoneal defects near the third and fourth portion of the duodenum. The lifetime risk of obstruction and bowel strangulation is around 50% with a mortality of 20% and higher. Despite the rarity of the disease, it poses a serious surgical problem. The high risk of obstruction and the associated mortality mandate repair once the diagnosis is established. We present the interesting case of a 60-year-old man with a left paraduodenal hernia who presented with abdominal pain, distention and vomiting and underwent subsequent laparotomy with hernia repair. The purpose of this paper is to review the etiology, pathology, diagnosis and treatment of paraduodenal hernia and to heighten the awareness of this rare but significant disease.

**Keywords:** Paraduodenal hernia, internal herniation, Intestinal obstruction, Bowel ischemia

## 1. Introduction

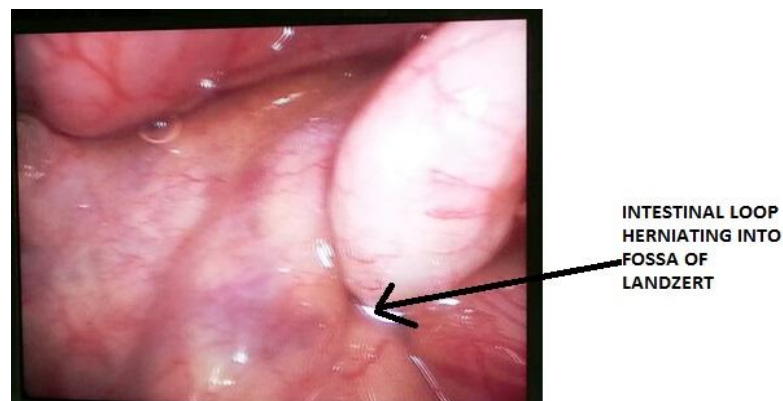
Paraduodenal hernia (PDH) is a protrusion of bowel into the retroperitoneal space through peritoneal defect near the third and fourth portion of the duodenum<sup>1</sup>. PDH is the most common form of congenital internal hernia accounting for half of all cases and 1% of all small bowel obstructions. 75% of these hernias are left-sided and due to failed embryological development. The reported lifetime risk of obstruction and bowel strangulation is around 50% with a mortality of 20% and higher<sup>2,3</sup>. The diagnosis of PDH is difficult as symptoms are often nonspecific and many clinicians are unfamiliar with this rare condition. We present an interesting case of a middle aged man with a left paraduodenal hernia and discuss etiology, diagnosis and treatment according to the current literature on PDH.

## 2. Case Report

A 60-year-old, male presented to the casualty with history of acute onset abdominal pain since 4 days. He described the pain as diffuse and had not been able to tolerate food for the last day. He had not passed stools since several days. He reported several episodes of vomiting prior to admission. His past medical history was not significant.

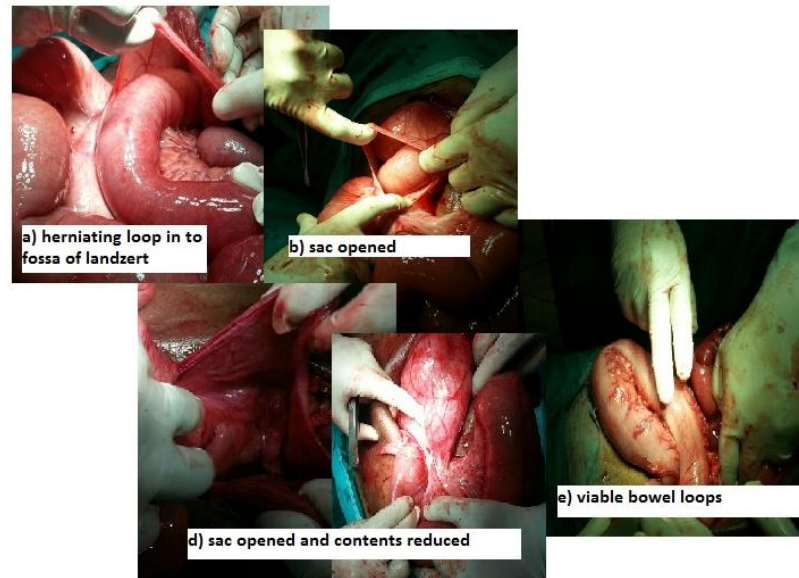
On presentation he was a febrile, with tachycardia and blood pressure 90/60 mm of Hg. His abdomen was distended with guarding without rigidity. His CBC, bio-chemistry and liver function tests were all within normal limits. Plain X ray abdomen showed multiple air fluid levels and USG showed normal except multiple dilated bowel loops. After informed consent for diagnostic laparoscopy with laparotomy was obtained the patient was taken to the operation room for diagnostic scopy and it showed a loop of intestine penetrating in to fossa of landzert (Figure 1).

**Figure 1: Diagnostic laparoscopy showing left paraduodenal hernia**



Exploratory laparotomy was performed. Intraoperative sac was opened and reduction of contents was done with release of volvulus and closure of the paraduodenal hernial sac in posterior peritoneum was done (Figure 2).

Figure 2: Exploratory laprotomy



The abdomen was closed in layers. Postoperative recovery was good and was discharged on post op day 8<sup>th</sup>. On 3 month follow up patient was asymptomatic.

### 3. Discussion

In 1857 Treitz defined an internal hernia as a retroperitoneal protrusion of an abdominal organ through a peritoneal fold<sup>1</sup>. These hernias can be classified according to their etiology as either congenital or acquired. Post-operative small bowel obstruction (SBO) due to internal hernia in certain patient populations (e.g. after liver transplantation or bariatric surgery) is increasing in incidence and as likely as obstruction from adhesions<sup>2</sup>. The focus of this discussion will be on congenital hernias, specifically paraduodenal hernias, as described in our case presentation. Among the numerous aetiologies of SBO internal herniation represents only about 1% of all cases, with paraduodenal hernia (PDH) being the most common entity half of the time. The true incidences of these hernias are difficult to establish as many cases are either completely asymptomatic or misdiagnosed as functional gastrointestinal abnormalities. Only around 50% of paraduodenal hernias for example present with SBO or bowel strangulation<sup>3</sup>. In large autopsy series the prevalence of PDH has been reported

Between 0.02 and 0.2% however it might be higher as suggested by a recent retrospective review of 294 upper gastrointestinal X-ray series that revealed PDH in 2% of the reviewed cases<sup>4,5</sup>. To date there have been around 500 reports in the literature and although PDH is a rare condition, they pose a significant surgical problem, as the lifetime risk of obstruction/strangulation is 50-66% with a mortality in these cases of 20% and more<sup>6,7</sup>. The abdominal surgeon should therefore be facile with the diagnosis and treatment of PDH. Meyers classified internal hernias according to their location<sup>2</sup>. Among the congenital hernias (paraduodenal, transmesenteric, pericecal, transmeso sigmoid, peri- and supravesical, further hernias through Winslow's foramen, mesoappendix, broad ligament, omentum or mesentery of a Meckel's diverticulum). PDH are most common, representing 50% of the cases. 3/4 of these are left sided and there is a sex predilection with a male to female ratio of 3:1.<sup>2,8</sup> Peritoneal fossae develop between the 5<sup>th</sup> and 11<sup>th</sup> gestational week due to an incomplete fusion of the posterior parietal peritoneum and the posterior abdominal wall. Superior and inferior duodenal fossae are most commonly found, in about 1-2% of cases a left paraduodenal fossa lateral to the fourth portion of the duodenum and posterior to the inferior mesenteric vein (IMV) and left colic artery is present (fossa of Landzert)<sup>9,10</sup>. The pathophysiology of hernia formation is not entirely clear. One theory suggests mechanical forces of undulating intra-abdominal pressure to lead to herniation in places where the peritoneum is yet incompletely fused (as in the case of left PDH)<sup>10</sup>.

In the case of right PDH (lateral and posterior to the third portion of the duodenum in Waldeyer's fossa) another mechanism seems to be responsible. Andrews described right PDH as a consequence of malrotation of the prearterial limb of the midgut in embryologic development<sup>11</sup>. In the 5<sup>th</sup> gestational week the midgut leaves the peritoneal cavity, with the superior mesenteric artery (SMA) defining the long axis of the bowel loop, dividing the midgut into a prearterial and postarterial segment depending on their relationship to the SMA axis. The prearterial limb undergoes a Counter clockwise rotation and enters the peritoneal cavity first. After completion of the rotation the prearterial limb and therefore its derivatives lie posterior and to the left of the SMA. The post arterial limb now follows and delivers the cecum into the right lower quadrant. In the case of right PDH, the prearterial loop does not complete its rotation and gets positioned to the right of the SMA. As the postarterial limb now rotates and the cecum descends, bowel gets trapped behind the ascending mesocolon. In right PDH features of malrotation are often seen on imaging or intra operatively. In either case, both left and right PDH lack a true hernial sac and therefore should be termed as prolapse or procidentia rather than hernia<sup>10</sup>. The diagnosis of PDH is challenging and is almost never achieved clinically. Patients are often asymptomatic or present with recurrent vague and general abdominal symptoms. The pain can be periumbilical or epigastric, colicky or constant<sup>2</sup>. Nausea and vomiting are frequently present, often pronounced postprandially. The symptoms can be dependent on patient position, with aggravation while standing and resolution in a supine position<sup>12,13</sup>.

Pain is often intermittent due to herniation and spontaneous reduction and attempts at imaging the hernia during the asymptomatic interval may be unsuccessful<sup>14</sup>. The symptoms are often mislabelled as functional gastrointestinal problems such as irritable bowel syndrome or non-ulcer dyspepsia<sup>15</sup>. Mean age of diagnosis is 29-38.5 years, and most patient report an average of 1.8 years of symptoms<sup>7,10</sup>. SBO with strangulation and ischemia occurs in up to 66% of all patients during their lifetime, with a mortality of at least 20% mainly from abdominal sepsis<sup>7</sup>. The presence of rebound tenderness, leukocytosis > 18,000/ml or bandemia > 6% have been associated with bowel ischemia in cases of both congenital and acquired internal hernias (intermittent abdominal pain is negatively correlated with ischemia)<sup>16</sup>. This serves more as an academic discriminator however, as it is generally agreed upon that any congenital internal hernia such as PDH should be repaired once diagnosed, given the high risk of obstruction with associated mortality. Improvements in imaging technology have increased the preoperative diagnosis of PDH.

Barium studies, CT and magnetic resonance imaging (MRI) have been used to diagnose internal hernias, the yield is highest when the patient is imaged during asymptomatic episode<sup>5,17</sup>. Features, which are similar in all three modalities, are the presence of clustered and well-circumscribed loops of small bowel in an abnormal location. In the case of left PDH, bowel loops are found interposed between the descending colon and the adrenal gland, they can displace the stomach, pancreas and duodeno-jejunal junction. The IMV runs along the anteromedial border of the hernia and is laterally and superiorly displaced<sup>17</sup>. CT imaging shows changes in the mesenteric vasculature such as engorgement, twisting, stretching or crowding. These vascular findings are the key to diagnosis as the hernial defect itself is not visible as both hernia orifice and herniating contents are fat attenuating. In right PDH the small bowel is

clustered behind the ascending and proximal half of the transverse mesocolon. The SMA and ileocolic artery run along the anterior border of the hernial neck and both bowel loops and mesenteric vessels can loop around the SMA. Evidence of malrotation such as abnormally positioned caecum or lack of a horizontal duodenum can be present<sup>2</sup>. Bowel wall thickening might be an indicator of ischemia. Traditionally PDH have been repaired and often diagnosed by laparotomy<sup>5,7,18</sup>.

The surgical principles are reduction and closure of the hernia defect without mesh, or widening of the hernial neck if the contents are not reducible. With left PDH, bowel can often be easily reduced and the peritoneum of the descending mesentery adjacent to IMV can be easily approximated with the posterior abdominal wall lateral to the fourth portion of the duodenum. Most authors advocate to spare the IMV but instances have been reported in the literature where the IMV was sacrificed without ill-effect<sup>19</sup>. Right PDH often poses more of a problem, as the hernial contents can be fixed to the retro peritoneum. In principle the operation tries to recreate the embryological situation prior to rotation (or better malrotation) of the prearterial midgut. Therefore the lateral attachments of the ascending colon in the paracolic gutter are hernia should not be approached from medially, as the SMA, ileocolic artery and right colic vein are in danger of being injured<sup>18</sup>. With the growing laparoscopic experience of many surgeons minimally invasive diagnosis and treatment of PDH has become a feasible and safe option<sup>12,20</sup>.

Since in PDH a very proximal obstruction without extensive bowel distension is present, there is usually sufficient working space for laparoscopy. To date 15 cases of laparoscopic PDH repair have been reported in 11 publications<sup>9</sup>. Of these 73% were left sided and in 77% of cases the hernia was primarily closed. In the remainder of the cases the hernial orifice was widened. Both morbidity and recurrence were cited at 6.7%. There is no consensus about how to close the hernial defect; both continuous and interrupted suturing techniques seem acceptable. All the patients had resumed oral diet by post-operative day three and the mean duration of hospitalization was four days<sup>9</sup>. Most authors consider apparent bowel ischemia or gangrene a contraindication to laparoscopy or an indication to convert to an open procedure<sup>3,4,9</sup>. In conclusion, PDH is a difficult in diagnosis and that requires a high index of suspicion from the surgeon and appropriate imaging. Essential components of treatment include bowel reduction and obliteration of the hernia defect by simple closure or by wide opening of the sac. Our case report demonstrates a rare presentation with intestinal obstruction and was managed successfully.

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